COLORADO RIVER RECOVERY PROGRAM Project No.: 110
FY-2004-2005 PROPOSED SCOPE OF WORK
Lower Yampa smallmouth bass and catfish control

Lead Agency: U.S. Fish and Wildlife Service

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Category:
__ Ongoing project
x Ongoing-revised project
__ Requested new projects
__ Unsolicited proposals

Expected Funding Source:
x Annual funds
__ Capital funds
__ Other (explain)

I. Title of Proposal: Smallmouth bass and channel catfish control in the lower Yampa River within Yampa Canyon.

II. Relationship to RIPRAP: Green River Action Plan: Yampa and Little Snake Rivers III.A.1.c.(1) Nonnative fish removal in Yampa Canyon.

III. Study Background/Rationale and Hypotheses:

Nonnative fishes have become established in rivers of the upper Colorado River basin, and certain species have been implicated as contributing to reductions in the distribution and abundance of native fishes primarily through predation and competition (e.g., Hawkins and Nesler 1991; Lentsch et al. 1996; Tyus and Saunders 1996). Controlling problematic nonnative fishes is necessary for recovery of endangered humpback chub *Gila cypha*, bonytail *G. elegans*, Colorado pikeminnow *Ptychocheilus lucius*, and razorback sucker *Xyrauchen texanus* in the upper Colorado River basin.

One of the five extant wild populations of humpback chub in the upper Colorado River basin occurs in Yampa Canyon on the lower Yampa River, Colorado (Valdez and Carothers 1998). Here, nonnative fishes adversely affect the native and endangered fishes in some fashion. Tyus and Saunders (1996) identified warmwater gamefish to have the greatest adverse effect on endangered native fishes. "This is consistent with the ANSTF (1994) report that listed ictalurids and centrarchids as frequent contributors to the demise of native fishes nationwide."

Nonnative channel catfish (*Ictalurus punctatus*) have been recognized as the principal predator and competitor affecting humpback chub populations in the upper Colorado River basin. However, a highly prolific and migratory population of smallmouth bass is the cause of even greater concern in Yampa Canyon. Electrofishing catch rates of smallmouth bass have dramatically increased in the Yampa and Green Rivers since 2002 (Anderson and Fuller 2002, 2003). It is our opinion that this increase in smallmouth bass abundance will exacerbate the negative impacts that nonnatives have on the Yampa's already distressed native fauna. Concerns for humpback chub and Colorado pikeminnow susceptibility to smallmouth bass predation mounted at the RIP's nonnative fish control workshop in 2003. During the workshop, smallmouth bass were implicated to pose the greatest threat to endangered and native fishes in the lower Yampa River, and the primary nonnative species to control shifted from channel catfish to smallmouth bass.

The smallmouth bass was first introduced into Colorado in 1951 (CDOW wildlife report, 2001) and is increasing in abundance throughout the lower Yampa River Basin (Anderson and Stewart 2003). Smallmouth bass are opportunistic predators, eating whatever prey is available. The bulk of their diet consists of crustaceans and aquatic insects during the first stages of life, and then small fish as they grow larger (Moyle 1976). By the time fingerling smallmouth bass are 1.5 inches in length, insects and small fish comprise the bulk of the diet. Smallmouth bass prefer cool, flowing streams, and large, clear lakes over rocky substrates. It commonly avoids sluggish or muddy water but is commonly encountered in clear to slightly turbid, shallow water, over substrates including sand, gravel, rubble, and boulders.

The optimum temperature for smallmouth egg deposition is 16.1-18.3 °C (Scott and Crossman 1973). Eggs are demersal and adhesive, and attach to rocky surfaces in the nest. The male guards the nest during incubation and after hatching until juvenile fish reach about 25mm TL (Emig 1966). Maturity is reached during their third or fourth year (Moyle 1976). Others, however, have reported that the fish mature mostly at age-2 (Emig 1966; Webster 1954). Studies at the South Bay Research Station, Manitoulin

Island, indicated that bass ranged very little during July and August, and that larger bass ranged farther than smaller ones.

The channel catfish was first introduced into the upper Colorado River basin in 1892 (Tyus and Nikirk 1988) and is now common or abundant throughout much of the upper basin (Tyus et al. 1982; Nelson et al. 1995). Channel catfish are found in low- to moderate-gradient rivers with sand, gravel, or boulder substrates (McMahan and Terrell 1982). Most adult channel catfish are found in large, deep pools and runs during daylight, but move to riffles or shallow pools at night to feed. Young channel catfish congregate in riffles or shallow pools (Aadland 1993). In Yampa Canyon, channel catfish were most abundant in turbulent areas associated with large substrates (Tyus and Nikirk 1988). Channel catfish spawn in late spring through early summer when water temperatures reach about 20–24ºC. Adults seek dark secluded areas associated with cavities or cover to build their nests and spawn (Sigler and Miller 1963; McClane 1965; Pflieger 1975; Simpson and Wallace 1978).

IV. Study Goals, Objectives, End Product:

The purpose of this study is to develop an effective control program for smallmouth bass and channel catfish in Yampa Canyon. The goal is to sufficiently reduce the abundance of smallmouth bass and channel catfish such that predatory and competitive impacts on growth, recruitment, and survival of resident humpback chub and Colorado pikeminnow are minimized. We propose to estimate the population size of smallmouth bass using mark/recapture analysis. During the first electrofishing pass of each year all smallmouth bass will be marked and returned to the river alive. Thereafter, bass will be collected, checked for a mark and removed from the river. Population estimates for channel catfish will be determined at the end of each field season using depletion analysis. The efficiency of removal efforts will be evaluated by comparing catch rates in 10 stratified reaches. The study specific objectives are:

1. Reduce the abundance of smallmouth bass and channel catfish in Yampa Canyon by capture and removal (lethal).

2. Compare the catch rates of smallmouth bass and channel catfish among removal reaches (and population estimates of smallmouth bass) to determine the efficacy of removal efforts.

End Products: Annual reports to RIP for each year of the study beginning 11/04 and as required throughout duration of the project.

V. Study Area:

The lower Yampa River in Yampa Canyon (from Deerlodge Park [river mile 46]

downstream to the Green River confluence [river mile zero]). This section of the Yampa River is within Dinosaur National Monument and subject to National Park Service operating regulations.

VI. Study Methods/Approach:

Hudson (2002) demonstrated that electrofishing was the most effective method for capturing centrarchids in the nearby middle Green River, and found that smallmouth bass catch rates were highest during September and October. Modde and Fuller (2000) experienced catch rates to be greatest for channel catfish during July and August. Nevertheless, to optimize the effort, sampling time will be based on flows and canyon access. Often, opportunities to access the canyon are restricted as early as July. Electrofishing becomes impractical during flows less than about 1000 cfs. Thereafter, using lighter equipment and volunteer assisted angling, sampling will continue until flows recede to below 300 cfs

Electrofishing: Two electrofishing rafts equipped with Smith-Root electrofishing control units (one per shoreline) will shock the entire length of river on at least three 4 to 5-day trips. All smallmouth bass captured during the first pass of each year will be marked (floy tag and right pectoral fin clip), measured (TL) and weighed and returned to the river alive. Thereafter, all marked and re-captured smallmouth bass will be identified, measured and weighed, and removed from the river. Channel catfish population status will be determined by measuring depletions and reductions in catch rates. All catfish will be measured and weighed and removed from the river.

Channel catfish and smallmouth bass collected during the last day of each electrofishing trip will be transfered to CDOW personnel at DNM Headquarters. These fish will be either relocated or retained for sportfish supplementation and/or research purposes (otoliths, gut content, etc.). This effort will be closely coordinated with CDOW personnel who will be responsible for tagging, hauling and releasing these fish into approved waters or for processing and disposal of specimens retained for research development.

Angling: Angling will be the primary sampling method after water levels drop below about 1,000 cfs. Groups of 10 to 30 volunteers per trip (depending on availability) will remove smallmouth bass and catfish from half the study area per each 5-day trip. Therefore, two trips will be required to remove nonnatives from all 10 reaches to complete one pass; that is, four separate angling trips will be necessary to accomplish two complete passes. Specific reaches sampled per trip will be determined randomly so that trip-specific effects will be distributed randomly. The importance of accurate and consistent data recording will be emphasized to volunteers during pre-trip meetings. Pre-trip meetings will consist of an orientation to the purpose of the removal effort, the methods of sampling, and the project protocol (i.e., work expectations, review of data sheets, need to throughly sample each designated area, need to keep accurate data, etc.). Each volunteer group will be supervised by U.S. Fish and Wildlife Service staff who will

direct the location of angling activity and provide logistic support to the anglers (e.g., bait, raft transportation, meals, and camp logistics). Angler activity will be directed toward specific reaches to allow complete coverage within and among reaches. Each angler will be provided data sheets and be held responsible to record time and location angled, species, numbers, and lengths of smallmouth bass and catfish collected. U.S. Fish and Wildlife Service staff will collect and review angler data sheets daily.

To allow for statistical comparisons of removal efficiency and to improve future removal efforts, the lower 46 miles of the Yampa River will be stratified into 10 contiguous reaches of approximately equal length. Stratification will be based on differences in geomorphic characteristics and logistic considerations.

Total numbers of smallmouth bass and channel catfish collected and catch per unit of effort will be recorded for each reach per trip and each gear type. Length and weight data will be used to determine the size structure of smallmouth bass and channel catfish removed. Estimates of weight, together with size and removal numbers, will be used to calculate total biomass of smallmouth bass and channel catfish removed. The experimental unit will consist of the average number of target species captured per trip. A maximum likelihood depletion estimator (CAPTURE) will be used to calculate population sizes for each reach per year of the study to track the effectiveness of removal efforts. Changes in length frequency distribution of smallmouth bass and channel catfish removed will be analyzed statistically. Year end analysis will summarize the biomass estimates and numbers of smallmouth bass and channel catfish removed from the Yampa River, determine if differences occurred between numbers and sizes removed among reaches, determine any changes in size structure of smallmouth bass and channel catfish associated with removal, and determine the percent of nonnative fishes removed.

To be effective and to maintain public understanding and support, it will be critical to initiate an active and widespread public relations campaign. We will assist the RIP staff and CDOW in their research and I&E efforts on nonnative removal projects. Smallmouth bass of all sizes will be made available to CDOW for further research purposes.

VII. Task Description and Schedule:

Task 1: Capture and remove smallmouth bass and channel catfish from the lower Yampa River within Yampa Canyon using electrofishing and angling during June–September, 2004-05.

Task 2: Analyze data and determine the smallmouth bass and channel catfish rates of removal. Contact and recruit angling volunteers and organize trips for the upcoming field season. Estimate population sizes of smallmouth bass and channel catfish, and track population changes in bass and channel catfish in the 10 river reaches of the lower Yampa River. Prepare annual reports that identify the means and level of smallmouth bass and channel catfish control (removal) achieved.

VIII. FY2004:

Deliverables/Due Dates: Annual Report November 15, 2004.

Budget:

Task 1		
Labor		
Project manager	13,571	(GS 14, 8 hr/d, 29 d at $463/d)
Project Biologist	11,267	(GS 9, 10 hr/d, 42 d at $270/d)
6 technicians	33,311	(GS 5 , 10 hr/d, 37 d at $151/d)
Shuttle (7 trips)	2,940	
Per Diem	11,088	
Covers food for Task-1 FWS personnel for three 46-mile raft-electrofishing trips; and food for FWS personnel and 10–20 volunteers for four 46-mile angling trips (23 miles of angling each trip for two complete 46-mile passes). Each trip is 5–7 days in length.		
Travel	3,024	
Equipment Outboard Motor and Props	2,500	
Subtotal	77,701	
Task 2		
Project Biologist	20,486	(GS 9, 8 hr/d, 96d at $214/d)
Technician	1,365	(GS 5, 8 hr/d, 12d at $114/d)
Supplies	1,260	
Travel	788	
Subtotal	23,899	
TOTAL	101,600	

IX. FY2005:

Deliverables/Due Dates: Annual Report November 2005.

Budget:

Task 1			
	Labor		
		Project manager	14,250 (GS 14, 8 hr/d, 31d at $463/d)
		Project Biologist	11,830 (GS 9,10 hr/d, 44d at $270/d)
		6 technicians	34,977 (GS 5, 10hr/d, 39d at $151/d)
		Shuttle	3,087
		Per Diem	11,642
			Covers food for Task-1 FWS personnel for three 46-mile raft-electrofishing trips; and food for FWS personnel and 10–20 volunteers for four 46-mile angling trips (23 miles of angling each trip for two complete 46-mile passes). Each trip is 5–7 days in length.
		Travel	3,175
	Subtotal		78,961
Task 2			
		Project Biologist	21,510 (GS 9, 8 hr/d, 100 d at $214/d)
		Technician	1,433 (GS 5, 8 hr/d, 13 d at $114/d)
		Supplies	1,323
		Travel	827
	Subtotal		25,093
TOTAL			104,054

IX. Budget Summary (Does not include overhead):

FY 2004 101,600
FY 2005 104,054

X. Reviewers:

T. Nesler, R. Valdez, K. Christopherson

XI. References:

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